



ITER: Unprecedented Global Collaboration for Fusion Energy

Fusion reactions power the sun and the stars, and fusion has the potential to produce clean, safe, abundant energy on Earth. By fusing light hydrogen atoms such as deuterium and tritium, fusion reactions can produce energy gains about a million times greater than chemical reactions with fossil fuels. Fusion is not vulnerable to runaway reactions, and long-term waste is easily managed.

The ITER project seeks to demonstrate the scientific and technological feasibility of fusion energy by building the world's largest and most advanced tokamak magnetic confinement fusion experiment. The ITER tokamak will demonstrate a sustained burning plasma, an essential step for fusion energy development.

The United States signed the ITER Agreement in 2006, along with China, the European Union, India, Japan, Korea, and the Russian Federation. The ITER members—representing 35 countries, more than 80% of annual global GDP, and half the world's population—are now actively fabricating and shipping components to the ITER site in France for assembly of the first “star on Earth.”

The ITER Tokamak

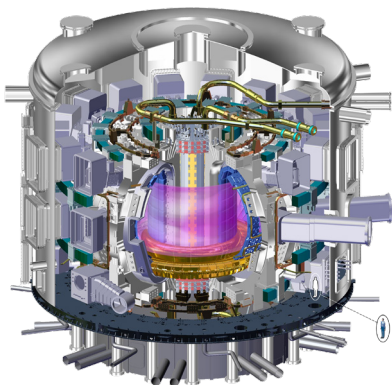


Illustration of ITER tokamak with plasma

Source: US ITER

Fusion thermal power has already been demonstrated in tokamaks; however, for practical fusion, sustained, self-heating fusion reactions are essential. The ITER tokamak is designed to achieve an industrial-scale burning plasma producing 500 megawatts of fusion thermal power. ITER's plasma volume is more than eight times greater than that of the largest existing tokamak.

When complete, the ITER tokamak will weigh more than 25,000 tons and over a million components will be integrated into this complex machine. The building that contains it will be the largest on the ITER site, extending approximately 200 feet above ground and 40 feet below ground.

35

Nations collaborating to build ITER

9%

Amount of ITER construction costs funded by the United States

70+

Portion of US funding invested domestically for design and fabrication of components

100%

Access to the research facility and scientific findings



US Innovation

US contributions to ITER are overseen by the US Department of Energy, with the US ITER project office managed by Oak Ridge National Laboratory. Princeton Plasma Physics Laboratory and Savannah River National Laboratory serve as partner labs. US ITER R&D, design, and fabrication rely on industries, universities, and national laboratories in nearly all states plus the District of Columbia.

US hardware contributions to ITER require exceptional scale, power, and precision, challenging US industry to produce:

- Miles of superconductors for magnet systems
- A 1,000 metric ton, 13 tesla central solenoid electromagnet (the “heart” of ITER)
- High-powered microwave and radio-frequency transmission lines
- Cryogenic pellet plasma fueling with demanding repetition rates
- High-throughput tritium processing systems
- Instrumentation for nuclear environments

U.S. fusion and related industries benefit from the technologies, know-how, and experience that results from U.S. engagement in ITER.

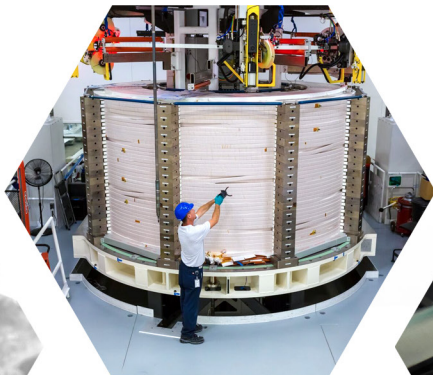
—National Academies of Sciences, Engineering, and Medicine (2021). *Bringing Fusion to the U.S. Grid*.



Construction of the ITER facility in Cadarache, France, began in 2010. The United States began deliveries to ITER in 2014. Hundreds of deliveries to ITER have been completed, and fabrication of multiple systems is under way.

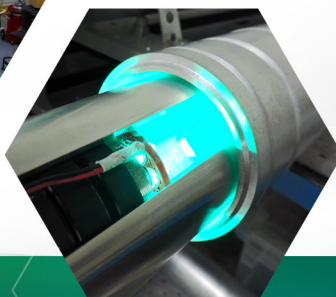
Source: ITER Organization

Source: US ITER



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